Chapter 1. Introduction and Framework.

1 Introduction.

- Why causal questions are important.
- Causal questions are problems with an manipulable intervention.
- They are important because they instruct policy and decision making.

2 Framework.

Methodologic framework for the course has elements (called Rubin’s causal model) as building blocks:

- subjects (units), at a particular place and time.
- treatments/interventions to compare (e.g., z=0 for standard, z=1 for new).
- potential outcomes; e.g., $Y_i(1), Y_i(0)$ are the outcomes that would be observed on the same subjects if assigned new, or, alternatively, if assigned standard treatment.
- causal effects (def.): comparisons of potential outcomes for the same group of subjects. They are not fully observed; they are the estimands, i.e., the scientific quantities we will try to estimate.
- Basic stability assumptions, to simplify problem (usually, assumed no interference between units, no versions of a single treatment, (SUTVA)).
- Assignment mechanism (def.): the rule (possibly probabilistic) by which subjects get their actual treatments \( \{Z_i\} \). The assigned treatments unmask the potential outcomes $Y_i(Z_i)$ (denoted by $Y_i^{\text{obs}}$), but mask the rest potential outcomes, denoted by $Y_i^{\text{mis}}$.

Note: course is organized by structure of assignment mechanisms.